

**Amendments to the Claims:**

The listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1-19. (Canceled)

20. (New) A process for treating a substrate for forming an oxynitride film on a surface of the substrate, comprising:

providing the substrate having an oxide film thereon; and

irradiating plasma having an electron temperature of 0.5 to 2.0 eV on the oxide film using a mixed gas comprising a rare gas and nitrogen gas to form the oxynitride film, wherein

a nitrogen atom content in the oxynitride film has a distribution such that the maximum value  $N_s$  of the nitrogen atom content in the oxynitride film at a surface of the oxynitride film opposite a surface facing the substrate is 10 to 40 atomic percent, and the maximum value  $N_b$  of the nitrogen atom content in the oxynitride film at the surface facing the substrate side is 0 to 10 atomic percent.

21. (New) A process according to claim 20, wherein the plasma is irradiated at a temperature of 250 to 500°C and under a pressure of 3 to 260 Pa.

22. (New) A process according to claim 20, wherein the plasma is generated using microwave irradiation by using a plane antenna member having a plurality of slots.

23. (New) A process according to claim 20, wherein the ratio  $N_s/N_b$  is 2 or more.

24. (New) A process according to claim 20, wherein the oxide film is formed by plasma processing or thermal oxidation.

25. (New) A process for treating a substrate for forming an oxynitride film on a surface of the substrate, comprising:

providing the substrate having an oxide film thereon; and

irradiating plasma on the oxide film using a mixed gas comprising a rare gas and nitrogen gas to form the oxynitride film, wherein

a nitrogen atom content in the oxynitride film has a distribution such that a ratio  $N_s/N_b$  is 2 or more, wherein  $N_s$  is the maximum value of the nitrogen atom content in the oxynitride film at a surface opposite a surface facing the substrate, and  $N_b$  is the maximum value of the nitrogen atom content in the oxynitride film at the surface facing the substrate.

26. (New) A process according to claim 25, wherein the plasma is irradiated at a temperature of 250 to 500°C and under a pressure of 3 to 260 Pa.

27. (New) A process according to claim 25, wherein the plasma is generated using microwave irradiation by using a plane antenna member having a plurality of slots.

28. (New) A process according to claim 25, wherein the ratio  $N_s/N_b$  is 4 or more.

29. (New) A process for forming a gate oxynitride film, comprising:  
providing a substrate having an oxide film thereon; and  
irradiating plasma having density of  $1 \times 10^{10}$  to  $5 \times 10^{12}/\text{cm}^3$  and an electron temperature of 0.5 to 2.0 eV on the oxide film using a mixed gas comprising a rare gas and nitrogen gas to form the oxynitride film.

30. (New) A process according to claim 29, wherein the plasma is irradiated so that the nitrogen atom content in the gate oxynitride film has a distribution such that the ratio  $N_s/N_b$  is 2 or more, wherein  $N_s$  is the maximum value of the nitrogen atom content in the oxynitride film at a surface opposite a surface facing the substrate, and  $N_b$  is the maximum value of the nitrogen atom content in the oxynitride film at a surface facing the substrate.

31. (New) A process according to claim 29, wherein the plasma is generated using microwave irradiation by using a plane antenna member having a plurality of slots.

32. (New) A process according to claim 29, wherein the gate oxynitride film has a nitrogen atom content distribution such that the maximum value  $N_s$  of the nitrogen atom content in the gate oxynitride film at a surface opposite a surface facing the substrate is 10 to 40 atomic percent, and the maximum value  $N_b$  of the nitrogen atom content in the gate oxynitride film at the surface facing the substrate is 0 to 10 atomic percent.

33. (New) A process according to claim 29, wherein the plasma is irradiated at a temperature of 250 to 500°C and under a pressure of 3 to 260 Pa.